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With the Author's Compts

THE

"PRESENT PRICES,"

BY THE

REV. A. HUXTABLE,

Rector of Sutton Waldron, Dorset.

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PREFACE.

The substance of this Pamphlet was written last Midsummer, and was intended for private circulation. Subsequent experiments and extended inquiry, have served to confirm the conclusion which I had formed.

It may be desirable to explain that the price of 5*s.* *for the Bushel of Wheat, has not been arbitarily selected, but with reference to that amount of produce,* 32 *bushels per acre, which in the average of seasons, under given conditions of soil, culture, and manure, may be expected. It is sufficiently plain that the charges on the crop remaining the same; a return of* 40 *bushels sold at* 4*s. each, would be as remunerative to the Farmer as* 32 *bushels at* 5*s.*

THE PRESENT PRICES.

—o—

If I had not been almost publicly called upon to defend an opinion expressed in private, that Farmers might hope to live and prosper, even at the present prices of grain and meat, I should scarcely have ventured to offer to the Agriculturists of England, some observations on the causes and remedies of the distress which exists amongst us. I heartily wish that I could believe the pressure to be less widely felt than so many describe it, but the language of complaint is too universal to leave a doubt that the capital of the great body of Tenant Farmers has suffered grievously during the past year. The cause of all this suffering many persons will at once assign simply to the withdrawal of protective duties on corn; but I believe that a very large proportion of the evils complained of may be found in the effects of the disastrous season of 1848. The rains which fell in the West of England were so incessant, that the summer fallows could not be properly cleaned, the hay harvest was one of the worst ever known, the wheat was deficient in quantity, and in quality still more inferior,—

in fact the year 1848 might be painted in the Agricultural Calendar, as one of foul fallows, drenched hay, sprouted corn, and spoilt straw. But if it was bad in the barn, it was worse in the stall; for during the winter which followed, came on that depreciation of stock which has continued ever since, and which can scarcely be reckoned less than 25 per cent. The straw and hay which were employed in feeding, had left their washed-out virtues in the field, and when the spring arrived, cattle which had been fattened with so much difficulty and expense, realized but little more money than had been paid for them when they were in their store condition. I doubt not that the value of the little good grain which was in the Farmer's hands, was depreciated by the large importations which took place on the repeal of the corn laws, but those importations were absolutely required for "working up" our own damp sprouted samples into something like decent flour, and it ought to be remembered that without this free admixture of foreign grain, large masses of the nation would have been condemned to eat dear and bad bread.

The low prices then of the wheat harvested in 1848, may be ascribed principally to the fact that a very bad season *necessitated* a large introduction of foreign corn; whilst the present price of wheat of the present year, seems due partly to the immense quantities of imported grain, and partly to the blessing of the very abundant harvest of 1849. It is not at all certain, that even a high amount of protective duty would materially have raised the market, for we find that even under the sliding scale in the year 1835, the average of the price of wheat was 40*s.* per quarter. It is a very remarkable and significant fact that although a larger quantity of foreign corn has been admitted this year, than ever has been known, it has all been cleared for home consumption; and at the same time during the last ten weeks 10,000 quarters of *British* corn have been sold more than during the corresponding period of last year.* Thus the lowness of price and the fulness of employment among our operatives have created an enormous consumption. Our views will be illustrated by the state of things in France at the present moment,—there under a high protective duty and an abundant harvest, the price of wheat has been continuously falling, till the value of a bushel of wheat has now sunk to 4*s.* which the French Agriculturists declare can not remunerate the producer.

In like manner, if good meat could really be furnished to the operative and labourer at five pence the pound, I believe that the consumption would be so greatly increased, that the surplus of the markets of Europe would not be able to satisfy the demand.

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* See the figures in the Economist, December 15.

Nor do I think that the great depreciation in the value of fat stock which came upon us last year, can fairly be attributed to the largeness of the arrivals of foreign cattle, as its principal cause; for the official returns declare, even a considerable *decrease* in the number of head entered in 1847, as compared with those brought into our ports in 1848; the total of all sorts being,—

162,355	in	1847.
126,674	in	1848.

so that diminished consumption, rather than increasing imports, would seem to be the explanation of reduced prices; whilst of this diminished consumption, the cause may perhaps be found in the distress which arose from the losses sustained in railway speculation.

There remains yet another topic of loud complaint, the low price at which animals in a store condition, whether bullocks, sheep, or pigs are now selling. But it appears to me a very doubtful matter, whether the present market value of store stock ought to be considered at all injurious, either to the wheat grower or the grazier. It should be borne in mind that animals of this class have for many years commanded an unduly high price, compared with that of the same animals when brought into a fat condition. For instance, so great has been the demand for sheep, at certain seasons of the year, that we have often been compelled to purchase them in a lean state at 8*d.* and 9*d.* per lb. and after some months to sell them when fattened at 6½*d.* or 7*d.* Also, in the cattle sheds of the arable farmer, especially in the Eastern Counties of England, it had become almost an axiom, that the bullocks bought in each autumn to convert his straw and roots by the help of cake and corn into good manure, must be sold out in the spring at a loss from £1, to £2, per head; a state of things which surely does not belong to a healthy relation between "Corn and Horn," the two arms of our agriculture. It is this inverse proportion of the prices of lean and fat stock, which has made the manufacture of manure, and therefore the production of wheat so much more costly than it ought to be. Whether the breeder of store cattle could afford to provide animals at a lower value, is a question that will be discussed hereafter.

I am aware that hitherto I have been considering only the past season,—the "panic" arising from a new order of things, and the disasters of one particular harvest. I have not yet referred to the question which is asked anxiously by so many thousands, "what will be the money value of wheat and meat hereafter, exposed as our farms now are to the competition of the soils and climates of the whole world"? For my own part I do not think that under the auspices of Free Trade grain can command a higher rate in London than it does in the principal ports of Europe, after the addition of the known charges of freight and commission. So long as a surplus of wheat, beyond the home wants, is produced in counties adjacent to our seaboard, the excess will be brought here largely, at the very lowest scale of profits, because London, Liverpool, and the other great cities, offer always a certain and ready sale, an advantage which is not enjoyed (I write feelingly) by many of our own remote inland towns. What, indeed, the average of foreign prices will be, it is impossible to predict; but for the sake of my argument, and in consonance with my own belief, I shall assume that in seasons of ordinary productiveness we cannot expect to obtain more on the average than *5s.* per bushel for our wheat, and *5d.* per lb. for our meat; if there is any probability of such a low average, there arises at once the important enquiry whether the British farmer, so heavily burdened as he is said to be, under local and national taxation, may hope to obtain an adequate remuneration for his capital with prices such as these? the answer to this question, (if we may judge from the tone and temper of recent Agricultural Meetings) if given by the great body of occupiers of land, would be "It is not possible." We hear on all sides that the present value of the products of the farm makes their cultivation a calamitous business, and that all who are concerned with the soil, Landlords, Tenants, and Labourers, have nothing in store but a certain future of ruin; unless, indeed, the Legislature shall interpose and take pity or render justice (the case is variously stated) by imposing a fixed duty on all foreign imports, which will at once produce a considerable revenue, and place the English farmer on something like an equal footing with the alien of alluvial soil, certain harvests, no taxes, and little rent.

Now if it could be found that the crying wants of the public treasury render necessary this supply of revenue, I cannot understand that any objection to a fixed duty could be justly raised on moral grounds. Surely, despite popular clamour, there is nothing in the nature of things more unreasonable in a tax on bread than in a tax on sugar, tea, or malt. It is for the Statesman to consider whether there may not be special political difficulties attending such an impost. But for myself, as an agriculturist, that is, a producer of wheat, beef, mutton, and pork, I should deprecate the re-imposition of any duty whatever upon *lean* cattle, upon beans, oats, barley, lentils, oil cake, i.e., upon the raw material which I require for the manufacture of my wheat and meat; and, unlike most of my farming friends, having no expectation of any further protection in any form being restored to the agricultural interest, I have long been seeking out consolation from another quarter; i.e., the better management of my own farm. And after an earnest searching into the ultimate principles that govern the production of human food, and revising every branch of my rural practice, I can rejoice in the conclusion that under the fullest Free Trade in cattle and corn,—farming, the most delightful, salutary, and beneficent of all secular occupations, may adequately recompense her votaries for their invested capital, *provided only it be sufficient and skilfully directed.*

It ought to be accounted a very auspicious circumstance, that the withdrawal of protective duties on foreign corn has come to pass at a period, in which unprecedented inquiry and interest are taken, both in the science and practice of farming. Each new suggestion of improvement is eagerly sought out, and swiftly the tidings fly throughout the rural world. The Royal Agricultural Society of England has already conferred great benefits, and is surely destined to confer greater on the practical parts of agriculture; and has now begun in good earnest to shew its belief that science shall yet bless the Farmer with some of her exhaustless treasures. Science has already done much to assist the art of agriculture,—in proof I might refer to the investigations of Bousingault, the Transactions of the Highland Society since 1843, to the essays and *analyses* which have appeared in the Journal of the Royal Agricultural Society, and amongst these, and above all others, to the papers on Agricultural Chemistry, by Mr, Lawes, which appeared in vol. viii. of the Journal, containing the report of the experiments carried on at Rothamsted Farm,—experiments so admirably arranged and philosophically interpreted, that they have revealed, what lay all concealed through "the dark ages" of mere "practice," the laws which govern cereal growth, and have reduced the conditions of wheat and turnip growing, of cattle feeding, and manure making within the cognizance of fixed principles.

But before enunciating those principles, and applying them to the great question in hand, it may be convenient to remind the unchemical reader, that all substances used for the food of animals, contain a gas called nitrogen; that other things being equal, the value of food for the uses of the farm is measured by the per centage of nitrogen it contains; that animals consuming corn and other highly nitrogenized bodies, take up into their system only a certain per centage of the nitrogen in their food, the rest being rejected in the manure,—that the manure rapidly passes into decomposition, and during that process 14 parts of nitrogen by weight, combine with 3 parts of hydrogen and constitute ammonia; that for practical purposes, 1lb. of nitrogen is reckoned as capable of forming 1⅕lb. of ammonia; that plants obtain their nitrogen chiefly through the supply of ammonia to their roots.

The great principles to which I have referred as having been established by the experiments at Rothamsted, are these:—

It is pre-supposed that the land is under the conditions of good husbandry, properly drained, free from couch, adapted by its texture (being either loam or clay,) for the growth of wheat, and valued for rent at 20*s*. per acre, subject to tithes, &c. in addition.

A.—Land of this quality will grow wheat year after year successively, the (drills being hoed clean of annual weeds,) and the produce in the average of seasons will be 16 or 17 bushels per acre, the straw as well as corn being removed.

B.—If the straw be returned to the field, and so the minerals are restored, each bushel of wheat beyond the natural produce of 16 bushels will require 5lbs. of ammonia.

C.—As this extra bushel of wheat only contains about 1lb. of nitrogen, and its straw, (100lbs. in weight) only ½lb. more,—it follows that wheat in its growth gets rid of 3lbs. of ammonia out of the 5lbs. furnished, and therefore is a very extravagant plant, and will be grown more economically in a rotation with plants of different habits in this respect; what is alleged of wheat is true also of the other *cereals*, barley, oats, and rye.

D.—That when animals are being fattened on highly nutritious food, it is found, that 1lb. of nitrogen in the food produces from 5lbs. to 7lbs. of live weight, which live weight contains about 3 per cent only of nitrogen;* consequently, when the increase of live weight, and the amount of nitrogen in the food are known (which is now the case with most of the "feeding stuffs" in use) we can estimate the quantity of nitrogen and of ammonia, and therefore the value of the manure.

E.—Consequently, if the prices of lean and fat stock are in a fair proportion to each other, (i. e. lean stock, weight for weight being cheaper than fat,) it will be found, (where stall feeding is thoroughly understood,) to be far more profitable to produce ammonia by fattening cattle, than by purchasing manure.

I shall proceed now to apply the principles A and B to answer the question,—"Can wheat be grown profitably for 5*s*. per bushel"?

In the first instance, I shall take the most unfavourable case, that of growing wheat successively year

See Journal vol, x.—"Sheep Feeding."

after year upon the same field,—the manure ammonia being all purchased. Here the problem will be,—At what cost can a crop of 32 bushels per acre be raised on the average of seasons?

Natural produce of the soil	16
The straw containing ½ per cent of nitrogen, of previous crop of 32 bushels weighing 3200lbs. will furnish by its decomposition in the soil 19½lbs. of ammonia, or	3½
12½ x 5, 63lbs. of ammonia will produce	12½
Bushels	32

The present price of ammonia, whether in guano or sulphate of ammonia, is 6*d.* per lb.

The field being free from couch, will require only one ploughing. The threshing is supposed to be performed by steam, at a cost of 1½*d.* per bushel. The horse labour has been charged at the cost for which it can be done by hired horses in this neighbourhood.

With these data, the cost of an acre of wheat will be as follows:—

	£	*s.*	*d.*
Rent £1, Tithes 5*s.*, Rates, 2*s.* 6*d.*, Way Rate 10*d.*	1	8	4
Ploughing, Harrowing, Drilling, Crushing...	1	0	0
Tradesmen's Bills	0	5	0
Bird-keeping and Hoeing	0	5	0
Reaping, 10*s.*, Harvesting, 3*s.* 1*d.*	0	13	1
Taking in Rick for Threshing & Marketing	0	4	10
Threshing 32 bushels at 1½*d.* per bushel ...	0	4	0
Seed, 2 bushels	0	10	0
62½lbs of Ammonia at 6*d.*	1	11	3
	6	1	6

	£	s.	d.	
The produce 32 bushels at 5s. ...	8	0	0	
Expense of crop	6	1	6	
For the interest on capital & profit	1	18	6	per acre.

This particular case has been adduced, not certainly as an instance of good husbandry, for it is the very reverse, but as an illustration of the manner in which the true principles of agriculture should be applied. I foresee that among the calculations which have just been given, there is one which will probably be vehemently opposed; that which attributes to land rented at £1 an acre the power of producing from its own resources 16 bushels annually; nor is it in my power to support the assumption which I have employed in the estimate, by adducing other cases precisely similar. It is true I might appeal to the evidence of Jethro Tull, who, for many successive years, by means of the horse hoe, raised upon the same field, and that of meagre staple, 16 bushels annually; but we know not the *previous* condition of his land. But vain is it to look out for an exactly parallel case to that of the Rothamsted Farm, for where else in the records of agriculture can we ask testimony of *fields*, the products of which have, for nine years continuously, been devoted to rigid chemical analysis?—an enterprize of such magnitude, cost, and importance, that it would seem to demand the resources of our great national Society of agriculture for its successful prosecution! But, though we cannot arrive at a *certain* valuation of the intrinsic fertility of other soils, and cannot accurately ascertain what our fields, freed from weeds and kept perfectly clean, will bear of corn every year, yet we may, in many cases, make a close approximation to the truth. If we carefully note the annual exports from an arable farm, how many bushels of grain are sold, how many cattle, sheep, and pigs, remembering that every 100lbs. of live weight contain as much nitrogen as 3 bushels of wheat, and every 100lbs. of dry wool as much as would raise 4 bushels, and deduct from this sum of exports the amount of nitrogen imported in hay, manure, and corn, we shall be able to form a pretty correct judgment of the powers of mother earth. I often do these rural sums, and they have taught me that upon farms rented at £1 per acre, of fair loamy quality, the natural resources of the soil, if they be, (they rarely are) concentrated upon growing products of market value, are fully equal, after all deductions of imported aid, to raise 32 bushels of wheat biennially. Especially have I marked, that upon his half-acre allotment, the labourer, on land of this character and value, is able on alternate halves of his ground, to raise and export 8 bushels of wheat and 20 sacks of potatoes; the manure employed, in addition to the restored straw, being that of his pig fatted upon 3 sacks of the un-saleable potatoes and 4 bushels of barley meal,—i.e., he sends off 8 bushels of grain and 17 sacks of potatoes every year, from 80 perches of land.

Although I have thought it useful to direct attention in this way to the inherent powers of the soil when cultivated and kept perfectly clean, yet reduce in your judgment those powers as you will, (provided you make them not *destructive,*) the justice of my estimate of the cost of growing wheat will not be invalidated, if for every bushel you detract from the natural produce, I can remove 5*s.* from the cost of the manure. I shall proceed to show that this can be done by a proper management of the stock upon the farm. The calculations upon which this statement is made must, in the present instance, be limited to the case of pigs and cattle; not that I have any doubt of mutton being subject to the same laws and conditions of price, but because the experiments which I have at command are chiefly concerned with the production of bacon and beef.

First, if pork be sold for 5*d.* per lb. at the existing *free trade prices* of beans, lentils, barley, and bran, pigs can be profitably fattened, and leave their manure *gratis.*

In July, 1849, I put up a large number of hogs to fatten, with a view of determining the relation which subsists in pigs of a certain breed and size, between the increase of their live weight, and a given amount of food consumed; their number varied from 70 to 90, and, as some were fattened, they were sold off and re-placed by others; the whole lot, and their food, were weighed weekly from July 9 till December 17, except on one occasion when a fortnight elapsed between the weighing. The meal employed consisted half of barley, the other half of lentils, tares, and beans, ground together into meal, a certain proportion of bran and pollard were also added.

The whole amount of food consumed was

	lbs		£	s.	d.
Meal	42047	Cost	135	0	0
Bran	9979	"	19	6	0
Pollard	2178	"	5	9	0
			159	15	
Attendance, &c.			4	12	
Total cost			164	7	

Whole increase of live weight .... 14467lbs.
Dead weight being forty fifty-sevenths ... 10152lbs.

lbs.	£	s.	
Meat 10152 at 4½d	190	7	
Food, &c.	164	7	
	£26	0	profit

lbs.	£	s.	
Meat 10152 at *5d*	211	10	
Cost of Food, &c.	164	7	
	£47	3	profit

To estimate the value of the manure.

Nitrogen in the meal at 3 per cent	1261	41
" bran at 4 per cent	399	16
" pollard at 2 per cent	43	56
	1704	13
Deduct nitrogen in the live weight sold at 3 per cent	434	01
Remaining in the manure	1270	12

But 1270 lbs. of nitrogen are equivalent to 1524lbs. of ammonia, that is to £38 2*s*. at the present market price of that article.

If we apply these 1524lbs. of ammonia to the production of wheat we shall obtain the following results:—

First suppose the truth of the condition of the soil to be such as is assumed in page 10, that is, it will grow 16 bushels per acre and 3½ bushels more from the manure of the straw, then as we have seen there will be required 63lbs. of ammonia; i. e. the pigs have left on my farm, manure adequate to raise 32 bushels per acre on twenty-four acres of land!

But we can afford to descend lower in the scale of fertility. Let us assume the vital energies of the land will furnish 10 bushels only per acre, then under the previous conditions, by the same amount of ammonia will the food for 32 bushels be supplied to the 16½ acres; nay, if the soil will yield nothing but its minerals and a resting place to the bare seed, my generous pigs will fully fertilize 9 acres of land, so that they shall bear the same number of bushels.

We may here also observe the connection between cheap meat and cheap grain. Attention has been already called to that remarkable property of wheat, which justly entitles it to the epithet of "spendthrift" in our vegetable kingdom, so wasteful is it of precious ammonia! The leguminosæ are of a totally different habit, instead of expending, they carefully appropriate and gratefully from their own resources add to the amount of ammonia supplied by art, and therefore in good husbandry, peas, beans, vetches, clover, &c., are cultivated in a rotation with the costly wheat, barley, and oats. But as they are therefore less exhausting to the soil, they can be grown more economically than their cereal brethren, and ought to be, and must become weight for weight cheaper than they. Add to this, beans, lentils, &c., contain just twice as much nitrogen, and are far more nutritious, and leave behind when consumed as food richer manure. Thus, in the preceding experiment if the *meal*, instead of being half barley, had consisted wholly of beans or lentils, of which the nitrogen is about 4 per cent, the manure would have contained 500lbs. more of ammonia; or according to the rate of ammonia in our estimate, have supplied the essential materials for 100 more bushels of wheat. Hence, the cheaper this class of grain in the market, the cheaper can we produce meat in the first instance, and afterwards wheat. The proposition I sought to establish, was, that wheat could be raised at 5*s*. per bushel when meat was 5*d*. per lb.; but in this particular instance, the meat could have been sold at 4½*d*. and even at 4*d*. leaving a small residue of money for casualities, and the elements of 300 bushels of wheat at 5*s.* per bushel.

But I see two objections which will be made to the argument in its present form. First, the consumer will say,—"We cannot live on pork only, we must have at least beef besides." Next, the farmer will justly state,—"That for the thorough cleansing of the soil, other plants must be grown than the cereals and leguminous." He wants to cultivate large root crops,—turnips, carrots, and mangold wurzel, which grown in distant drills, permit in their early stages, the thorough weeding and stirring of the intermediate soil. In this alternate "four-field" system can the green crops of the rotation, whether clover or roots, be profitably converted into beef at 5*d.* per lb. as its selling price ?

I feel now that I have arrived at the very battle field of agricultural contention, and assailants will come forward with every form of denial and unbelief. A large body of "practical men" would treat the question as an absurdity, and stoutly allege that, so far from possibility is it to convert the green things upon the farm into meat, profitably, at the prices of recent years, they will not even pay their own expences; and so they persist in charging the rent and taxes of the fallow year upon the straw crop;—in other words, they maintain that though red clover, at the cost of

2cwt. of guano and the seed, will yield to the scythe rich fodder equivalent, if dried, to 3 tons of hay per acre, or in the next shift, early vetches, succeeded in the same season by Aberdeen and white turnips, or, in the root-fallow, swedes from 18 to 20 tons, & still more certainly 25 tons of mangold; all these ample productions of nature must even beg and borrow of the wheat crop the very rent of the acre which bears them! If any gentleman really holds this opinion, I am not surprised that he should shudder at the very mention of five shillings in connexion with the bushel of wheat.

But there is a more formidable class of opponents to my cause, they, to wit, who will not withhold, indeed, from the root crops the respectability of being solvent occupiers of the soil; but then they are refused any other merit, they are said to be simply just, not generous; for even their last remains, the very manure which they leave behind, is demanded in payment of the debts they have incurred in their life or death. I cannot consent to this estimate of their worth, I am a believer in green crops; I consider them not as kill-weeds only, and mere auxiliaries to a higher good, but as in themselves, when assisted by the straw of the grain crop,—positive enrichers of those who grow them successfully and can use them wisely. With their help I believe it is quite possible to produce beef at 5*d.* per lb. and raise wheat at 5*s.* per bushel.

In considering the important subject of green crops, there are two distinct questions to be resolved,—the first, What is the cost of their production ? the second, What is their value, when consumed on the farm, estimated by the increase of live weight, in animals of known value, and by the worth of their residue as manure ?

Let us suppose a farm of 300 arable acres of medium quality, the present rent £1 per acre, the tithes and rates amounting to 8*s.* 4*d.* more. A steam engine consuming annually 7½ tons of coal for threshing; and a pair of mill stones will be required,—implements to the value of £250,—five pair of horses will be needed for the cultivation of the land—all the green crops and roots are to be consumed in the house.

To estimate the cost of cultivating 60 of these acres, we have the following items :—

	£	s.	d
A pair of horses will eat 2 bushels of beans weekly, in 52 weeks, and 2 bushels of oats weekly, for 34 winter weeks ; this corn at the *present low rates*, oats 18*s*, beans 32*s* per quarter, will amount to	28	9	0
The Carter	26	0	0
Deterioration of horses annually	6	0	0
Smith £1 6*s*., Saddler £1 10.	2	16	0
Ten per cent on the prime cost (£60) of the pair	6	0	0
10 per cent on (1 fifth of implements) £110–£11 Five per cent on wear and tear of implements, £5 10*s*.	16	10	0
1 fifth of 7½ tons of coal for threshing	1	15	0
The whole cost of 60 acres is ...	£87	10	0
Therefore, motive power per acre is	1	9	0
Manual labour	1	12	0
Rent and charges	1	8	4
This is the general cost per acre, but there must be added to the green crops for manure—			
Two cwt. of guano	1	0	0
Therefore, cost of an acre of green crops is...	£5	9	4

We must now turn to a more difficult question, the value in alternate husbandry of the green crop consumed upon the farm. Here, indeed, we must lament the truth of that reproach, that agriculture, though first of the arts, is the most backward of the sciences; and in this most important matter our statistics are altogether scant and unsatisfactory. If, for example, we wish to learn the value of the clover crop for summer foiling; I scarcely know whither to turn for information. Mr. Curwen in his "Hints on Agriculture", cites some remarkable instances of increase of live weight from the consumption of clover; to which he assigns, as green food, the value of £13. 4*s.* per ton when beef was 7*d.* per lb., that is £9 16*s.* per ton when it is only 5*d.*, which, upon his estimate of 16 tons per acre, gives a return of £7 12*s.*, apart from the manure.

I found this summer upon my clay farm that 12 acres of clover and 3 acres of Italian rye grass supported for 4 months the following head of stock;—5 horses, 31 milch cows, 1 bull, 4 heifers, (18 months old) and 22 calves. Unfortunately the produce in butter and of increased weight was not kept distinct. The *gross* return from 54½ acres of my green crop after deducting the oilcake, straw, hay, and manure purchased, also £47 10*s.* for the *depreciation of stock*, amounted to just £8 per acre.

With respect to the worth of the root crop we have some more satisfactory data.

In the prize essays of the Highland transactions, vol. v, p.p. 462, Mr. Boswell attributes to a ton of yellow turnips the virtue of bettering an animal's condition by 21 lbs. additional weight, or of making 12 lbs. of beef, which at 5*d*. per lb. makes the ton of turnips to be worth 5*s*. Mr. Stephenson, (vol. vi, p.p. 66) states that 90 lbs. of turnips produce 1 lb. of live weight, or that a ton of swedes, valued at 6*s*. 8*d*., when beef is 5*d*. per lb., will give a return of 22 per cent on the cost of feeding.

Mr. Howden in a very interesting trial of the comparative merits of the short-horn and Angus breeds, (reported in the Agricultural Gazette, 1847, p.p. 677,) discovered that 82½ tons of turnips, (52½ tons were white globes, and 30 tons swedes,) gave 166 stones live weight, or one ton produced 28lbs. live weight, that is, 17lbs of beef, which is worth at 5*d*. per lb. 7*s*. 1*d*. in other words, a ton of swedes is worth 7*s*. when beef is at the price named. This is a very low price at which to estimate the worth of the swede root, and will not be at all assented to by many feeders, who acknowledge that they made far higher returns with them than 7*s*. per ton.

But whence come all these variations of opinion amongst practical men? I believe that they arise,—partly from differences of virtue in roots themselves depending on the quality of the land upon which they grow, and on the manure which fed them, and on the season of the year when they are eaten.—Partly, also on the judgment of the cattleman, and the due apportionment and proper admixture of the food. It is injurious to a stall-fed animal to fill his rumen with a large quantity of watery roots, for he wants for assisting his digestion, a certain proportion of dry matter, such as is found in hay and straw, at the time I mean commingled with the roots, (but I must not at present write an essay on the Bovine economy).—*Partly from the cattle being badly bought and worse sold; i.e. the lean animal being at the best purchased at the same price per weight, as that which it will bring when it is sold fat.

But to return to my swedes,—if we assume that we have to deal with a fair crop of 20 tons, it would be, upon the value already given, worth £7; now if we add to the general expense of the root crop, £5 9*s*. 4*d*. the special cost of seed, 3*s*. then £5 12*s*. 4*d*. will be the sum total of outlay, which leaves to the swede crop a margin of nearly £1 per acre; but, after interest upon the other capital, insurance, risk, &c., shall have been taken into account, there will only be a few shillings remaining in favour of the turnip grower,—that is exclusive of the residuary virtues of the root. But these are very considerable, and have moreover a very close connection with our bushel of wheat. Now, a fattening bullock with all his vast internal arrangements cannot extract from the food which we give him, so much nutriment as the pig can. From the cases examined by Mr. Lawes, (Journal vol. viii. 256) and from many other instances that have been analysed, it would appear that out of 5lbs. of nitrogen consumed in the food, about 4lbs. remain in the dung. Now, 1 ton of swedes contains nearly 4¼lbs. of nitrogen, our crops therefore of bulbs contains 83½lbs. of which the bullocks carry off in their flesh 16lbs. and leave upon the farm 67lbs. of nitrogen, equivalent to 83½lbs. of ammonia,—worth in guano, &c. £2 1*s.* and equal to the production of 16 bushels of wheat, independently of the value of the straw undigested and remaining in the litter. But 20 tons of swedes will have left in the fields, 6 or 7 tons of tops, which are especially valuable adjuncts of the bulbs,* for they contain weight for weight from 2 to 3 times as much nitrogen as the portly bulbs, i.e. 6 tons of tops, will leave in the soil, 60lbs. of nitrogen, or 72lbs. of ammonia, i.e. 12 bushels of wheat; so that the swede crop has left behind for the soil's behoof ample materials for our 32 bushels of wheat, the field being taxed to yield only a quota of 4 bushels. So, if we re-assemble the scattered parts of our calculation, we shall find in the swede and wheat crops grown in succession,—

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* See note A at the end.

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* See Journal of the Agricultural Society, vol. viii, p.p. 552.

	£	s.	d.
Dr.			
Wheat Crop, General Charges	4	9	4
Seed	0	10	0
Swedes	5	9	4
Turnip Seed	0	3	0
	10	11	8
Cr.			
Beef, at 5*d*. per lb.	7	0	0
Wheat 32 bushels at 5*s*.	8	0	0
	15	0	0
Cost ...	10	11	8
	4	8	4

To satisfy the interest of the other capital not yet specified, chiefly £7 an acre for stock, which at 20 per cent would amount to £1 8*s*. and thus leave, even at the dreaded prices, now so familiar to our ears, a margin of about 30*s*. per acre for each year.

But I have selected an unfavourable case. There is a fallow crop, far more certain in its growth, heavier in its bulk, and nutritious in its nature than the swede, which I now claim to press into my calculation. The mangold wurzel is destined I hope in the southern and western parts of England to supplant the swede when the whole spring and summer can be devoted to its growth. Wherever the vetches or other early spring fodder occupies the land, then the swedes or Aberdeens will appropriately follow; (for which spring feed, by the way, I have taken no credit in my balance above,) but when a winter fallow and spring preparation of the soil can be devoted to one great culture,—the mangold should be its care.* If we estimate the produce at 26 tons, we shall have realized a far more valuable crop than any other, not excepting the clover field; for each ton contains 6½lbs. of nitrogen, or an acre will provide us with 169lbs, of nitrogen, or when consumed by cattle, as before calculated, afford 169lbs. of ammonia, and its leaves, amounting to 8 tons, will enrich the field where they lie, with 105lbs. of ammonia, the leaves therefore generally are sufficient manure for the following crop of wheat. There is one hindrance to its wide cultivation, especially upon heavy lands, namely, its rapid tendency to grow in size towards the end of the autumn, which makes us loath to remove it till we get far into the season of white frosts and heavy rains in November, and thus it becomes a precarious crop to secure. But the investigations of a French chemist, whilst searching into the sugar properties of the field beet, have discovered that the root has attained all its valuable qualities 6 weeks before it is ripe, and that the great increase of size in its latter stages is due entirely to an access of water. This discovery will enable one to plant the mangold closer together, and to remove it early in October, so that though we may lose somewhat in the pride of our show roots, we shall really suffer little in weight and actually gain in the proportion of nutritive matter.

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* See note B. at the end.

At this stage of my observations, I begin to feel anxious to provide an answer to a difficulty which may occur to any one wishing "to go deeper" into house feeding and root cultivation. "Where" it may be asked, "shall we be able to get store stock to consume these roots?" "Will not that class of animals regain their elevated price which you have acknowledged to be so fatal to the prosperity of the arable grazier"? This very grave objection I have sought to obviate in my own practice, and as humbly think with great success, in the following manner; I have a large dairy of house fed cows, *every* calf of decent proportions (out of 60 annually, we fat only 3 or 4,) is reared; if it is a heifer, then in due time she may contribute to the milk pail: if a male that he should be from the first devoted to his beef-making destiny.

The process, cost, and rearing are as follows:—

FIRST MONTH.

Each calf has half a gallon of new milk, which at 6*d*. per gallon, is 3*d*. or weekly	1	9
Half a gallon of skim milk weekly	0	5½
	2	2½
		4
The monthly cost is ...	8	9

SECOND MONTH.

Half a gallon of skim milk, gives weekly	0	5½
Half lb. of cake per day...	0	3
	0	8½
		4
Second month's cost, is ...	2	9

From the third month till he is 12 months old he will consume 150lbs. of cake, and an average 25lb. of mangold wurzel for 309 days	7725lbs.
In the second year he will consume on the average 50lbs. daily for 365 days	18250lbs.
Whole mangold wurzel in the two years	7725
	26970
about	11½ tons.

		£	s.	d.
The consumption of cake in the second year will amount to 2lbs. a day or 365 x 2 ...	730lbs.			
Add cake of first year	150			
	880	£3	4	0
In the second year for the last six months, the animal must have 2lbs of bean meal daily, 365lbs.		1	2	0
Milk, &c. first 2 months, ...		0	11	6
Attendance		1	14	10
		6	12	4

	£	s.	d.
But at the end of two years the beast will weigh 36 score at 5*d.* per lb.	15	0	0
Deduct the expenses	6	12	4
The worth of 11½ tons of mangold at 14*s.* per ton ...	8	7	8

If I follow the previous estimate of general expense per acre, the labour cost there given includes the item for attendance, therefore to arrive at the value of 11½ tons of swedes, we must add this to £8 7*s.* 8*d.*

	£	s.	d.
	8	7	8
	1	14	10
Therefore, 11½ tons are worth	10	2	6

i. e. one ton, exclusive of expenses is worth 17*s.* But in this case we must give especial heed to the worth of the manure. The 11½ tons of mangold eaten, contain 51lbs. of nitrogen, (if the calves be supposed to appropriate ⅙ part,) will leave behind 51lbs. of ammonia; add to this in the extra food given to them,—

Nitrogen in 880lb. of oil cake	43lbs.
" 360lbs. of bean meal...	14
	57

equivalent to 67lbs. of ammonia. Therefore the sum total of the corn producing element in the manure is 118lbs. of ammonia, equal in money value at 6*d.* per lb. to £2 19*s.* and in wheat-power to 23 bushels.

The whole crop of roots then, used thus, exceeds £20 an acre. at a cost of not more than £6, exclusive of the manure; itself a pledge of a future fertility.

From these facts and figures I infer, that in a system of house-feeding and cattle-rearing it is both possible and profitable to grow wheat at 5*s.* per bushel, and produce beef at 5*d.* per lb.

It may be objected "You are not *sure* of a crop of 26 tons of mangold wurzel, or of 32 bushels of wheat per acre", certainly not; but agriculturists must carry on their business with the same trust in the continuous goodness of God that animates the merchant and others who embark their all on the contingencies of winds and seasons. "Probability", says Bishop Butler, "is the guide of life"; and there is a very high probability that the amount of produce, and general results, indicated in the preceding pages, will, on the *average* of seasons, be attained. But you cannot attain them without employing adequate means, and these means are not legislative protection, but our own individual resources, exertions, and arrangements.

The word "Means" will, perhaps, suggest to some the financial use of the term, and provoke the remark often cited in this question, "It is all very well for Mr. So and So who has other resources, but farmers generally have not capital enough to carry out a high system of feeding." If, hereby, it is intended really to concede that with sufficient capital certain results can be secured, then the reply is very obvious, "You surely do not mean that the price of food is to be enhanced to the nation at large on account of your own want of money to carry out the requirements of the best husbandry." I do not *assert*, because I cannot prove that tenants have not sufficient capital for the required purpose; still I fear that there will be, at the present reduced level of prices, a deficiency of capital felt; for competency to produce wheat at 7*s*. per bushel is a different thing from competency to produce it at 5*s*. A revolution of prices like this must for a time in all cases disturb; in many, I fear, fatally derange the calculations of even enterprizing men, and which implies a transition state of suffering most painful to dwell on, but not coming within the scope of legislative interference. Now though I will not make the invidious statement that farmers have not sufficient capital, I do not hesitate to express my belief that generally their farms and homesteads are too often wanting in the requirements of high cultivation. But on every side the tenant farmer exclaims—"Rents are too high", I think so too, in most cases, unless in former years they have been much too low,—too high, that is considering the very imperfect accommodation farms offer for making a maximum return from the products. But no reasonable reduction of rents can meet the difference of prices unless there be a change in the system of farming, or great increase of crops. In most cases the amount which is sought as an abatement of rent, is that which for the good of all parties, should be spent in multiplying the powers and capabilities of the farm; not in raising costly edifices—the pride of the estate and admiration of the amateur,—for these cannot be carried out extensively on any property, and the case is urgent, and will not brook the delay of years; cheap materials are at hand; there are on almost every farm trimmings of plantations and hedge rods for roofs, straw for covering, larch poles for posts, and wattle or furze for walls. But though this rustic architecture, so necessary and sufficient for warmth and shelter can be so cheaply extemporized, there is one matter requires great caution,—

the flooring of the cattle stalls must at all costs be made water tight, that not one drop penetrate; let them be of brick, laid in and covered with cement, leading through leaden or gutta percha pipes to a cemented brick tank; close to which let there be a walled and roofed dung reservoir, so that the urine for the tank may be daily pumped over the heap, and its overflowing return thither again. That tank will require and repay your utmost vigilance, for in that gloomy cavern lurks ammonia, the spirit-like essence of the farm, ever longing (and no wonder) to fly off to boundless air, and with it, alas! flies the truth of all my calculations, and your hope of profitable returns. If the carbonate of ammonia fly off from the manure, it loses all its wheat-making virtue. The cheapest way, if you have sufficient tank room, is to dilute the liquid manure with two parts of water, or let it flow over and dissolve gypsum, or pour in from time to time a calculated quantity of sulphuric acid.

But at the end of these observations, which are already somewhat extended, I must forbear to multiply practical rules; especially those which concern the application and distribution of liquid manure, the very life-blood of the farm.

It has been my object in these pages to call the attention of farmers to general principles and the laws which govern the production of animal and vegetable food. If these laws be clearly apprehended, and judiciously acted on, I have no fears for the prosperity and continued progress of our agriculture. We shall then no longer dread the luxuriance of American Prairies, or the inexhaustible corn fields of Russia; nor will the great landlords, and brave yeomen of England, continue to meet only to depress each other, and take the heart out of all Saxon enterprize; for then it will no longer be considered ruin to themselves, though wheat remain at 5*s.* per bushel and meat at 5*d.* per lb.!

Sutton Waldron, Dec. 26*th,* 1849.

APPENDIX.

Note A. page 24.

Partly also I think, from the injudicious selection of the costly adjuncts which are often given with the roots to hasten the process of fattening.

I refer principally to the preference which has of late been yielded to the use of linseed, rather than of oil cake,—now the difference in the prices of these articles of food is very great.

Good American cake can now be purchased at £7 per ton. Good linseed at 42s. per quarter is more than £11 per ton. The ton of cake at 5 per cent contains 114lbs. of nitrogen ; the ton of linseed at 4 per cent contains 90lbs of nitrogen.

Now this higher proportion of the most valuable ingredient ought, according to the principles already advanced, to indicate higher fattening capabilities in the cake, as it will assuredly make a richer manure. I am aware that since Mr. Warnes first called attention to his admirable manner of preparing linseed for the use of cattle ; the opinion of agriculturists generally has been in favour of the seed. But as yet there have been no fair comparative trials. I mean that the cake has not yet been offered to the cattle under the same conditions ; for the seed has been reduced to coarse meal, and after being boiled or soaked in cold water, has been poured over, and incorporated with, a considerable bulk of chaff, &c. But cake has been given to cattle in small *lumps*. I can with all confidence recommend my own method in preference. After crushing the cake as is usually done, I run it through the mill stones, and reduce it to fine meal. I then steep it in cold water for 24 hours, and pour it over a mass of turnips and straw. Of the virtue of this plan I cannot speak comparatively, but I can absolutely. Last May my roots were all finished, and the first cutting of Italian rye grass also; & hunger threatened 78 cows & beasts. I then cooked as above, 2lbs. of cake, and poured it over a mass of chopped straw, and added 3lbs. of lentils and bean meal, daily ; the cost of the *purchased* food was 2*s.* 1*d.* per week, and upon this diet the milch cows increased their butter sensibly beyond their yield when feeding on Italian rye grass. They prospered on this diet for 3 weeks till the clover was ready.

Note B. page 27.

Excepting the oft-quoted experiment of the Earl Spencer, (Royal Agricultural Journal, vol. ii, p.p. 296.) which was on a very limited scale, so few are the cases recorded in the annals of English agriculture which concern the value of mangold wurzel for fattening purposes, that I feel tempted to subjoin some determinations of their worth in the estimation of foreign agriculturists.

A. Thaer Principes Raisonnes, Tom. iv, p. 363, says that in his experience 450lbs. of mangel are equivalent to 100lbs. of good hay. The great

APPENDIX.

Swiss Agronomist Baron Le Crud, in his "Economie Theorique and Pratique, tom. ii, p. 155," states that after 26 years experience, he is able to pronounce without hesitation, that when consumed in the spring months 250 to 254lbs. of these roots are equal in virtue to 100lbs. of hay. Boussingault, at Bechelbrun, in Alsoce, finds their nutritive powers to be in comparison of good meadow hay as 400 : 100. The highest authority with French farmers, M. de Dombasle (see his charming Calendrier du bon Cultivateur, p.p. 79 and 296, which ought to be done into English) says that his experience at Roville teaches him that he may substitute 261lbs. of mangel roots for every 100lbs. of hay. Schwezr the Director of the great Wirtemberg Agricultural Institute, sets 330lbs. of mangel as worth 100lbs of hay,—p. 249

Taking the average of these estimates, we may assume that 338lbs. of this root are equal to 100lbs. of hay, or that 26 tons of mangel are equivalent to 7½ tons of hay!

But it is in Belgium that we find such high store set by this crop. In the "Nouveau Systeme de Culture of Le Docte, p.p. 252," is detailed a grand experiment at d'Op-Lieux, by Baron de Woelmont. See a notice of his farm in Le Comte Conrad de Gourcy's very interesting Voyage Agricole en Belgique, p.p. 64) He fattened 50 beasts on mangel, giving each beside rather less than half a ton of hay; and selling them at 45 centimes la livre,—(of 17oz.)—i.e., from 4½*d*. to 4¾*d*. per lb.; his mangel was worth in the beef-making power 13*s*. per ton. Another experiment appraises them at 13*s*. 5*d*. per ton, beef being 4½*d*.; therefore 14*s*. 8½*d*. per ton is the value when beef is 5*d*. Surely at such a price for beef and mangel we need not despair!

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